Utilization and content of antenatal care comparing adolescent and older first time mothers in 13 countries of West Africa: a cross-sectional analysis from nationally representative surveys

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Abstract (255 words)

Background: West Africa has the highest proportion of married adolescents, adolescent birth rate, and maternal deaths in sub-Saharan Africa. However, few studies have focused on the type and quality of health care accessed by pregnant young women.

Methods: We utilized data from the most recent Demographic Health Surveys to compare use, timing, source and components of antenatal care (ANC) between adolescent and older first-time mothers in 13 West African countries. The sample included primiparous women aged 15-49 with a live birth in the five-year survey recall period.

Findings: The study sample was 19,211. Overall, 91% of first-time mothers utilized ANC. Only 35% of adolescents compared to 42% of all users commenced ANC during the first trimester. Across West Africa, 62% of adolescents had 4+ ANC visits compared with 76% of 20-24 year olds and 86% of women 25 years and older. Amongst those with 4+ visits, 49% of adolescents received the four ANC components examined compared with 61% of 20-24 year olds and 73% of women 25 years and above. Although most women received ANC in the public sector, in nine of the 13 countries, the proportion using the private sector was higher among older mothers.

Interpretation: Although a large percentage of West African adolescents utilize some ANC for their first birth, they seek care later, make fewer visits during pregnancy and receive fewer components of care than older first-time mothers. Governments must ensure the pregnancy care accessed by adolescent mothers is of high quality and tailored to meet their needs.

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Introduction and background

Adolescents make up at least one third of the population in most low- and middle-income countries in Africa, Latin America, and Asia (1), where approximately 2.5 million births occur annually to girls under the age of 16 (2). Globally, pregnancy and childbirth were the leading causes of death amongst adolescent girls aged 15-19 in 2015 (3). Compared to older women, adolescents' pregnancies carry a higher risk of severe morbidities (e.g. hypertensive disorders of pregnancy) (4,5), and their children less than five years have a higher risk of death (6,7). Sub-Saharan Africa (SSA) has the second highest maternal mortality ratio (8) and the highest rate of adolescent pregnancy and childbearing globally (9). Adolescents in this region also had the lowest use of contraception (7%) between 1998 and 2011 (9). It is projected that adolescents from West and Central Africa will make up the highest percentage of married adolescents (28%) in SSA by 2030. Most adolescent births are concentrated amongst poorer and less educated women (9), likely as a result of limited access to health services associated with low socioeconomic status and stigma around pregnancy in teenage years, and sometimes, outside marriage (10). Early pregnancies usually hinder adolescents' ability to obtain an education and reduce future employment opportunities, reinforcing socioeconomic disadvantage (11,12).

The adolescent childbearing rate is one of the key indicators to track Sustainable Development Goal (SDG) 3, which aims to ensure healthy lives and promote wellbeing at all ages (13). Other related health indicators include coverage of essential health services such as antenatal care (13). ANC is intended to put women in contact with the health system throughout their pregnancies in order to prevent, detect, and treat complications. The World Health Organization (WHO) recommends that women begin ANC in the first trimester of pregnancy to maximize its benefits (14). Between 2002 and 2016, the WHO advocated for a four-visit model of care called "focused ANC," which prioritized delivering evidence-based interventions at each visit (15). Although many maternal complications are difficult to detect during the antenatal period, some, such as hypertensive disorders, pose an increased risk to pregnant adolescents and can be identified and proactively managed during ANC (16). Furthermore, ANC visits are thought to play a key role in promoting awareness of potential labour complications and encouraging skilled birth attendance at delivery (17). Whilst preventing unintended adolescent pregnancies by expanding access to contraception is important and has received increased attention (19), there has been much less focus on the type and quality of health care accessed by the sizable number of teenage girls who become pregnant.

Studies comparing the use of maternal health services by adolescents and older women have shown conflicting results, with some finding poorer health service utilization among adolescents, and others no disparity (20–22). The two most recent multi-country studies comparing maternal health service utilization between adolescents and older women published in the SSA region used dated

Demographic and Health Survey (DHS) data collected in five (23) and 21 countries (20) from 1996 to 2001. Both studies focused on ANC and examined three important indicators (utilization, timing, and frequency of visits) to address gaps in the health system. However, they did not examine the components of ANC provided to either group of women.

The objective of this study was to assess the use of antenatal care, providers of this care, and its content with a focus on comparing adolescent and older first-time mothers in West Africa using DHS data. Adolescent births are more likely to be first births, which are associated with higher levels of maternal care seeking (24). Therefore, we restricted our analysis to first live births and report on three separate age categories to avoid biases associated with age and parity (20). To meet the needs of young mothers in this sub-region, researchers and policy-makers need to understand the extent and types of disparities in the care they receive. This can inform future interventions aimed at achieving universal coverage of maternal health care, leading to more equitable use of high-quality services.

Role of the funding source

The funder had no role in study design, data collection, data analysis, data interpretation, or manuscript writing and submission for publication. OO and KW had access to the raw data. The corresponding author (OO) had full access to all data in the study and final responsibility to submit the paper.

Methods

Geographical setting

The West African sub-region was defined based on the Economic Community of West African States (ECOWAS) list of constituent countries.

Source of data

This study uses most recent DHS data collected since 2010, which was available from 13 countries (Benin, Burkina Faso, Ivory Coast, Gambia, Ghana, Guinea, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo) (Figure 1). The DHS are cross-sectional, nationally representative household surveys, usually covering 5,000 to 30,000 households. Data were obtained through standardized interviews with women of reproductive age (15-49 years) and rely on self-report of pregnancies resulting in live births up to five years prior to survey. The DHS use a multi-level clustered sampling survey design and individual women's survey weights were accounted for when estimating the

selected indicators for each country and age category (25). Data collected by the DHS provide a set of comparable indicators across countries including the providers where women seek ANC and the clinical components of care.

Population

Women aged 15-49 with a live birth in the five-year recall period were included if their most recent birth was also their first birth (referred to as "primiparous women" throughout this paper). We categorized women based on their age at the time of their first birth into age groups 10-19 (adolescents), 20-24 (young adults), and 25 years and above (adults). All women age 20 years and above are referred to as "older women" in subsequent text. We limited our analyses to the most recent births because the DHS only collect data about ANC utilization for women's most recent live birth.

Variables and definitions

Utilization of ANC: We considered women to have used ANC if they had reported at least one ANC visit during the pregnancy.

Timing of ANC: We considered women to have utilized ANC early if they reported their first visit in the first trimester of the pregnancy.

Intensity of ANC: We used four ANC visits as the benchmark for the intensity of ANC because this was the WHO standard in use when these DHS data were collected. In four visits, women are more likely to receive all the necessary preventive interventions recommended (15,26). Receiving fewer than four visits was considered 'low intensity', whilst four or more visits was considered 'recommended intensity'.

Source of provision: The DHS collect information on where women who used ANC sought care, and women can specify multiple providers. We aggregated each country's detailed response options of providers into public (governmental) and private (non-governmental) sectors similarly to a previous study of ANC (27), with the exception that we merged private not-for-profit and private commercial providers into one category of private sector. Since women could seek care from multiple providers, we used four final categories of ANC provision: 1. Public (at least one public sector provider, no private providers), 2. Private (at least one private provider, no public), 3. Public and private (at least one public and private provider), and 4. Only home-based ANC or other providers whose sector was unspecified.

Components of ANC: DHS enumerators asked each woman who reported using ANC whether she received specific care components during any of the ANC consultations she attended during her most recent pregnancy. We used four questions on the components of ANC: whether the woman had her blood pressure taken, had a urine sample taken, had a blood sample taken, and whether she received information on pregnancy complications. We excluded questions on tetanus vaccination, iron supplements, deworming pills, and malaria prophylaxis, because the DHS ask if women took them at any point during the pregnancy rather than whether they were specifically provided as part of ANC. Components of care were assessed by looking at the proportion of women using ANC receiving each component, and all four components combined. We limited the analysis of components of care to women who reported receiving recommended intensity ANC (4+ visits), as it has been argued that the recommended interventions can be provided in four or more visits (28).

Missing data

We found no missing data in the utilization of ANC from the study sample. We considered the very limited missing data amongst users in the timing of first ANC visit (1%), intensity (3%), and components of care (0.2%) as not receiving care, and coded the sector of care (1%) as "home and others" if women used ANC but were missing information on their provider.

Statistical analysis

We calculated country- and sub-regional-level statistics for women aged 10-19, 20-24, and ≥25 at the time of first live birth, adjusted for survey-specific weighting. Specifically, we calculated: (i) the percentage of women attending at least one ANC visit; (ii) the percentage of women attending ANC in first trimester; (iii) the percentage of users attending 4 ANC visits; (iv) the sector where women received ANC; and (v) the percentage of women receiving each component of ANC, as well as all 4 components, among users of 4+ visits. For ANC timing and intensity, we calculated the risk ratios comparing outcomes between older mothers (women aged 20-24 years and 25 years and above) to adolescents as the reference group. We compared the proportion of adolescents receiving all four components of ANC to the proportion of each group of older women (20-24 and ≥25 years) using chi-square tests. However, we primarily report on the comparison between adolescents and young adults in our results because we are most interested in exploring how their experiences of health care compare and if there is any difference as they transition from their teenage years into young adulthood, when childbearing may be less stigmatized. Analyses were conducted in StataCorp. 2015. *Stata Statistical Software: Release 14*. College Station, TX: StataCorp LP. Sub-regional estimates were computed for all of the included countries in West Africa combined by weighting country-

specific estimates by the country's population size based on the United Nations population estimates for the median survey year of 2013 (Figure 1)(29).

Ethical approval

We obtained permission to use these datasets for these analyses from the DHS Program. The DHS receive government permission and obtain informed consent from all participants. The Research Ethics Committee of the London School of Hygiene and Tropical Medicine approved our secondary-data analysis.

Results

The 13 countries included in our study conducted their most recent DHS between 2010 and 2014 (Figure 1) and account for 99.9% of population in the 15-country sub-region. Cape Verde and Guinea Bissau were excluded because they have not published a DHS from 2010 onward. Our study included 19,211 primiparous women (Supplementary Figure 1), including 10,025 (52.1%) women aged 10-19, 6,099 (31.8%) 20-24, and 3,087 (16.1%) 25 years and older.

Utilization of any ANC

Figure 2 shows the percentage of women in the study sample who used ANC at least once for each country. In the majority of the included countries, utilization was high (≥90%,) in all three age groups except in Mali, Niger, and Nigeria. In Mali, utilization was <90% in all three groups. Utilization was <90% in Nigeria in women aged 10-19 and 20-24, and in women aged 10-19 in Niger. Overall, ANC utilization by adolescents ranged from 56% in Nigeria to near universal in Burkina Faso, Ghana, Gambia, Liberia, Senegal, and Sierra Leone.

Timing and intensity of ANC

Table 1 shows the timing of the first ANC visit and intensity of ANC by maternal age group amongst ANC users. Although overall utilization was high, only 42% of all ANC users within the sub-region commenced ANC during the first trimester of pregnancy. This ranged from 29% in Nigeria to 68% in Ghana. Estimate for the entire sub-region indicates that young adults were 1.2 times as likely to commence ANC in the first trimester as adolescents (95% CI= 1.2,1.3). Evidence of differences in ANC timing between adolescents and young adults were observed in nine out of 13 countries.

Across the 13 countries, 71% of ANC users reported obtaining ANC at the recommended intensity (4+ visits), ranging from 41% in Niger to 91% in Ghana. In all countries except Liberia, Gambia, Mali, and Sierra Leone, the proportion of women receiving the recommended intensity of ANC increased with age. Within the sub-region, 76% of young adults received the recommended intensity of ANC

compared with 62% of adolescents (RR 1.1, 95%CI=1.1,1.2) and 86% of adult women. Burkina Faso and Niger were the only two countries reporting recommended intensity of less than 50% for adolescent ANC users. The disparity in ANC intensity comparing adult women to adolescents was greatest in Burkina Faso, Ivory Coast, Niger, and Mali.

Source of ANC

The public sector was the largest provider of ANC in all age groups in the sub-region (82%), followed by the private sector (14%). This pattern was consistent across all countries (data not presented). Source of ANC for first-time mothers by country is shown in Figure 3. In all countries, first-time mothers' use of providers categorized as "public and private" and "home or other" was marginal (<4%). Burkina Faso and Niger had the largest proportion of women who received care from the public sector (both >95%). The countries with the largest private sector share of ANC provision among primiparous women of all ages were Nigeria (22%), Liberia (20%), Benin (15%), and Ghana (14%). Figure 3 also shows that in most countries, private sector use rose as age group at first birth increased. This pattern was more notable in Benin, Burkina Faso, Gambia, Liberia, and Nigeria than in other countries. In all countries except Ghana, the percentage of adolescents receiving ANC in the private sector was smaller than that of older women.

Components of ANC care

Figure 4 examines the components of care received by women with recommended intensity ANC by age group. The service most frequently received by all women across all countries was blood pressure measurement (94%), whilst the least frequently received was information on complications (68%). Among all first-time mothers, urine testing ranged from 48% in Niger to 99% in Ghana; blood testing ranged from 59% in Niger to 99% in Ghana; and provision of information on complications ranged from 37% in Guinea to 93% in Sierra Leone. In all countries except Nigeria, there was no significant difference in the proportion of adolescents who had their blood pressure measured compared with women age 20-24. However, adolescents were less likely to receive the other three services compared with young adults in approximately half of the study countries.

Across the sub-region, only 59% of first-time mothers with recommended intensity ANC received all four components (blood pressure measurement, urine tests, blood tests, and information on complications), ranging from 30% in Niger to 83% in Ghana. The proportion of adolescents who received all components (49%) was lower than the proportion of women aged 20-24 (61%) and 25 and older (73%). This disparity was observed in all countries ($p \leq 0.05$) except in Benin, Liberia, Senegal, and Togo.

Discussion

Our study utilized the most recent DHS data to describe ANC provision among adolescents and older women with first births in 13 countries of West Africa. To our knowledge, this is the first study to focus specifically on the West African sub-region and to compare the source of care and ANC components received by adolescents to that of older women. Overall, our results show that utilization of any ANC for first births across all age groups was high and comparable between adolescents and older women, in all countries except Nigeria. However, the timing, intensity, and components of ANC utilized for first births was inadequate for most women, and worse for adolescents

Similar to our findings for Nigeria, research in Kenya and Uganda suggests that adolescents are less likely to attend any ANC (21,30). Conversely, a DHS analysis published in 2006 suggests that there is no difference between the proportion of women who use any ANC comparing adolescents and older mothers in five African countries, after adjusting for parity and other socio-economic variables (23). This is in line with our findings for all countries except Nigeria, which are adjusted for parity by limiting to first births.

We found that adolescents were more likely to initiate ANC after the first trimester of pregnancy and to have fewer ANC visits compared to the older counterparts. This finding is similar to an analysis of DHS data from 21 countries in SSA conducted by Magadi et al. (2008) (20). Early initiation of ANC and receipt of four visits are likely to be correlated because it is more difficult to achieve the prescribed higher number of visits if a woman initiates ANC late. In addition to receiving essential interventions, studies demonstrate that women who attend ANC early and frequently are more likely to utilize skilled providers for ANC and delivery care than those who do not (22,31). Some of the reasons for late and less frequent ANC utilization among pregnant adolescents in SSA include financial barriers, lack of information about the risks of pregnancy and benefits of ANC, stigma within the community, and disrespectful treatment by health workers (21,32–34).

Among all women seeking pregnancy care for their first birth, the public sector was the largest provider of antenatal services. This is consistent with evidence from other research conducted in the broader sub-Saharan Africa region (21,27). Our results also suggest that in nine out of the 13 countries, private sector utilization of ANC increased with age group at first birth. Lower utilization of the private sector among adolescents may be associated with challenges in financing this type of care. Supplementary table 1 shows that 21% of adolescents in our study population were in the poorest wealth quintile compared with 13% of women aged 20-24, and 7% of women aged 25 and above. Women may have more agency to access health care, and are more likely to seek perceived higher-

quality care in the private sector as age at first birth increases (35). Whatever the case, since the public sector is accessed more by adolescents in West Africa, policies and programs should focus on eliminating existing barriers to care within this sector, and tailoring services to the needs of this age group (36).

Even among women with recommended ANC intensity, many did not receive the four components of care examined, and adolescents in most countries were less likely to receive each individual care component as well as all four components. Amongst these components, blood pressure measurement and urine tests are important for making a diagnosis of pre-eclampsia (37), which accounts for more morbidity and mortality in adolescents than older women (4,5). Hence the differences in the proportion of adolescents receiving urine tests in some countries may be an obstacle to detecting and managing this condition appropriately. It is also notable that counselling on pregnancy complications, which requires no specialized equipment or supplies, was the least likely intervention to be reported by first-time mothers of any age (38). Counselling is particularly important for adolescents because they are more likely to have poor birth outcomes, tend to have less knowledge about childbirth than older women, and often face more social and financial obstacles to accessing care and support.

Although there have been many initiatives to increase access to reproductive health services for young people, the majority of them have focused on contraceptive counselling and provision and sexually transmitted infection prevention (39,40). One study examining quality of maternity care received by adolescents in Swaziland described the care provided as sub-optimal and missing many essential components (such as physical examinations, blood and urine testing), resulting in increased complications during childbirth. This was attributed to poor provider training and negligence (41). The societal stigma often associated with adolescent pregnancy may play out as reduced conscientiousness in provision of care by healthcare workers when an adolescent is involved. Although ANC interventions are important for all women, they are especially critical for adolescents who have limited information related to childbirth and are more likely to lack social support, and when pregnancies are unintended or occur outside of the scope of formal unions (10). It is necessary for health systems interventions to ensure that adolescents who continue with their pregnancies receive adequate information and high-quality services to prepare them for birth and birth-related emergencies (42).

In 2016, WHO revised its recommendations to state that pregnant women should have a minimum of eight ANC visits to foster a more patient-centered approach to care and improve newborn health outcomes (18). These guidelines are likely to be challenging for countries in West Africa to achieve.

Whilst it is possible that the proportion of adolescents receiving this new standard of care will be lower than for the currently recommended four visits, a minimum of eight contacts with the health system may provide additional opportunities for adolescent mothers to be offered all the essential components of ANC prescribed. However, as countries choose to adapt these new guidelines, it is imperative for governments to focus on providing the recommended interventions and services during ANC visits to improve pregnancy outcomes, rather than simply promoting increased care seeking with insufficient quality and content of care.

Three West African countries (Guinea, Sierra Leone, and Liberia) which experienced the largest ever recorded Ebola epidemic in 2014, have also had their health systems compromised since the DHS data used in our analyses were collected. Studies suggest that their capacity to provide high-quality health care has been reduced, access to maternal and reproductive health care in these countries has declined, and morbidity and mortality has increased (43,44). This is likely to have had a significant impact on access to care by adolescent mothers who are often more vulnerable.

Limitations

Our study has several limitations, largely related to the availability and characteristics of the secondary data used. Although the vast majority of the sub-regional population (99.9%) is included in our analysis, two countries (Cape Verde, Guinea-Bissau) did not have a DHS between 2010 and 2014. Second, data was only collected on antenatal care for the pregnancy related to the most recent live birth in the survey recall period. Our sample thus excluded women whose first birth was not the most recent, did not occur in the recall period, as well as those whose first pregnancy resulted in a pregnancy loss, abortion, or stillbirth. We compared the age distribution and sociodemographic characteristics of women in our analyses to our ideal sample of all women aged 15-49 with a first birth in the five-year recall period (Supplementary Table 1). Overall women in our study sample were slightly more educated, wealthier, and less likely to ever have been married or in union than our ideal study sample. Third, all variables were self-reported. Hence, for variables such as sector of provision where ANC was received, there may be some misclassifications if women were unable to clearly distinguish between public and private providers, especially in countries where governments subcontract other providers of care. Fourth, although other interventions such as iron tablets, malaria prophylaxis, drugs for intestinal worms, and tetanus injections are provided during ANC in many of these countries, we only examined four components of ANC because DHS do not specifically ask if these interventions were provided as part of ANC. Finally, it is possible any differences seen between adolescent and older mothers' access to ANC may be due to residual confounding.

Conclusion

Our study found that, although a large percentage of West African adolescents have at least one ANC visit prior to their first birth, they seek care later, attend fewer ANC visits, and receive fewer components of care than older first-time mothers. These results have important implications for national and sub-regional policy in West Africa.

Many countries have policies and interventions that aim to prevent unintended pregnancies in adolescents and to minimize child marriage, including in West Africa where the rates of child marriage are highest. However, policy-makers must acknowledge that many pregnancies among adolescents are wanted, particularly when they occur within the context of marriage. For pregnant adolescents, the ability to gain access to high-quality healthcare affects both of their short-and long-term health outcomes, as well as the health and life trajectories of their children. It is therefore critical that access to and quality of antenatal care is improved for adolescents in West Africa. Given the higher rate of utilization of the public sector for ANC and the low proportion of ANC attendees receiving the four components of ANC, there is a greater need to focus on improving the quality of ANC care provided by the public sector to achieve lower maternal mortality and morbidity rates in West Africa.

Declaration of interests

OO, KW, MD, ER, FC, CL, and LB report funding from MSD for Mothers during the conduct of the study. The other authors declared no conflicts of interest.

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Contribution

OO, KW and LB conceptualized the study with input from MD, ER and FC. KW analyzed data and prepared results with input from OO and LB. OO wrote the first draft of the report and all authors contributed to writing subsequent drafts of the report and agreed on a final version.

Research in context

Evidence before this study

DHS have provided an invaluable source of nationally representative household survey data to understand health seeking behaviour during pregnancy and delivery over time in many countries in sub-Saharan Africa. To gather evidence on how antenatal care utilization and quality differed between adolescents and older women, we searched PubMed and Google Scholar with the search terms “Antenatal care”, “Africa”, and “Demographic Health Surveys”. The two most recent studies comparing antenatal care received by adolescents to older women in sub-Saharan Africa used older DHS data (from 1996 to 2001) in five and 21 countries. Both studies focused on three ANC indicators: utilization, timing and frequency of visits, but used different ages to classify women into younger mothers and older mothers. Their results differed with one study suggesting no difference between adolescents and older women and the other suggesting reduced access to care for adolescents. We found no studies focused on West Africa nor any that assessed components of care or which types of providers are meeting the needs of younger mothers.

Added value of this study

To our knowledge this is the first study to describe utilization of antenatal care within West Africa and to describe and compare the source and components of care received by adolescents with older women.

Implications of all the available evidence

Our results show that majority of the adolescent first time mothers in the 13 West African countries included in our study utilize some antenatal care during pregnancy. However, they start receiving care later, make fewer visits and receive fewer prescribed components of care than older first time mothers. With the current and projected high rates of adolescent marriage and low contraceptive prevalence rates within the sub-region, there is an urgent need for researchers, program managers, and governments to improve the coverage and content of antenatal care for younger mothers. This is critical to reduce the mortality and morbidity associated with giving birth in the region, and to improve the health outcomes of younger mothers and their children.

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